



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/806,469

03/23/2004

Eiju Komuro

P06276-US

1711

21254

7590

12/02/2005

MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC  
8321 OLD COURTHOUSE ROAD  
SUITE 200  
VIENNA, VA 22182-3817

EXAMINER

BUDD, MARK OSBORNE

ART UNIT

PAPER NUMBER

2834

DATE MAILED: 12/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/806,469

Applicant(s)

KOMURO ET AL.

Examiner

Mark Budd

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2005.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-18 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

Art Unit: 2834

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 17 and 18 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims are vague and indefinite in that they contradict parent claim 1. In claim 1 the distance between the piezoelectric substrate and the ceiling member is specifically limited to 100  $\mu\text{m}$  or less, thus these claims which allow a distance of 150  $\mu\text{m}$  contradicts the specific parameters of parent claim 1. Thus, one of ordinary skill in the art cannot properly determine the metes and bounds of these claims.

Claims 1-18 are rejected under 35 USC 103 as unpatentable over Takeishi in view of Onishi for the specific reasons set forth in the previous office action (5-18-05). Applicant is correct in noting the examiner's error regarding a dimension of 5  $\mu\text{m}$  for the air gap. The 5  $\mu\text{m}$  to mention does refer instead to the electrode thickness. However, Takeishi explicitly notes (see column 3 lines 4-13) that the prior art typically uses solder bumps having a diameter of several tens to 100  $\mu\text{m}$ . This establishes the prior art air gap as being equal to the bump dimension plus the piezoelectric electrode dimension plus the substrate electrode dimension. Since the thickness (diameter) of the solder bump can vary between 30  $\mu\text{m}$  (several tens) to 100  $\mu\text{m}$  prior to the assembly which would reduce the height dimension, it is felt that this is a clear teaching of providing an air gap of less than 100  $\mu\text{m}$ . It also is a clear teaching of providing a bump (electrically

Art Unit: 2834

connected projecting portion) having a maximum diameter the larger then 150  $\mu\text{m}$ .

Attention is also drawn to column 11 lines 57 -58 which designate a bump thickness for #21 as being 60  $\mu\text{m}$ . Looking at figure 2 for example it is noted that the air gap dimension would be less than 60  $\mu\text{m}$  plus the thickness of #32 (45  $\mu\text{m}$  (column 11 lines 7-11) plus the thickness of #15 (5  $\mu\text{m}$ ) a thickness of about 110  $\mu\text{m}$  is provided before compression bonding of the device. This would lead a thickness of a round 100  $\mu\text{m}$ . Looking at it another way, the air gap thickness as defined by the right hand bump #21 in figure 12 would be equal to the height of #33 plus the height of #21 minus the thickness of piezoelectric layer which would render an air gap thickness of 105  $\mu\text{m}$  minus the thickness of the piezoelectric element (again before pressure bonding) which would clearly render an air gap of less than 100  $\mu\text{m}$ . Regarding the air gap limitations (25  $\mu\text{m}$  and 50  $\mu\text{m}$ ) there is nothing essentially critical for these dimensions other than they are smaller than the originally claimed 100  $\mu\text{m}$ . If these dimensions were critical, they would have been included in the original set of claims. The specification does not demonstrate any particular criticality to these dimensions. Since optimization of a known device through for example routine experimentation has long been held to be within the skill expected of the routineer, the provision of the specific dimensions would have been obvious to one of ordinary skill in the art.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Budd whose telephone number is 571-272-2019. The examiner can normally be reached on Monday through Thursday from 6 a.m. to 4 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg, can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

Art Unit: 2834

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Mark Budd Primary Examiner Art  
Unit 2834